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NOTES FOR STUDENTS.

KOERNICKE finds that Roentgen rays, after first accelerating growth for a brief period, as do many injurious agents, later retard it.[2] Experiments with radium bromid[3] inclosed in glass, so that only the β and γ rays acted (α rays and the gaseous emanation being stopped by the glass), showed a strong retardation of the growth of seedlings, but no fatal injury. Somewhat similar inhibition of growth occurred with certain fungi after prolonged action of the rays.—C. R. B.

HARVEY[4] has made a study of the physiographic ecology of Mount Ktaadn, tracing the origin and development of the flora and noting the various factors operative in determining the present plant physiognomy. He also shows that the accepted principles of physiographic ecology hold in general in alpine as well as in lowland regions. The associations discussed are the crustaceous lichens, the reindeer moss, the alpine-tundra, the "Krummholz," the Picea-Abies forest, the "roches moutonnées," the pioneer stage of the alpestrine meadows, the meadow stage, the shrub stage, ponds, and sphagnum bogs.—J. M. C.

BOODLE[5] has made an experimental study of the ecological anatomy of the leaves of Pteris. Leaves grown in dry and exposed situations are xerophytic and have a "hypoderm;" while those sheltered and shaded are of the "shade-leaf" type, having no hypoderm and either weakly developed or no palisade tissue. The same differences were developed by different leaves of the same plant, and by different parts of the same leaf. A plant grown first in a damp greenhouse and then in the garden produced shade-leaves in the former and sun-leaves in the latter. It was further noted that the mature type of structure is not determined at an early stage in the growth of the leaf.—J. M. C.

SEWARD[6] considers the Carboniferous, Rhaetic, and Wealden floras of South Africa in an important paper. The Ecca beds are held to correspond in a general way with the Upper Carboniferous of the northern hemisphere, and are more definitely correlated with the Karharbári beds of the Lower Gondwana in India. Evidence from the contained plants emphasizes the well-known similarity which existed during the Carboniferous between the floras of India, South

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[2] KOERNICKE, MAX, Ueber die Wirkung von Röntgenstrahlen auf die Keimung und das Wachsthum. Ber. Deutsch. Bot. Gesells. **22**:148–155. 1904.

[3] KOERNICKE, MAX, Die Wirkung der Radiumstrahlen auf die Keimung und das Wachsthum. *ibid.* 155–166. *pl. 10.* 1904.

[4] HARVEY, LE ROY HARRIS, A study of the physiographic ecology of Mount Ktaadn, Maine. The University of Maine Studies, no. 5. pp. 50. *figs. 6.* Dec. 1903.

[5] BOODLE, L. A., The structure of the leaves of the bracken (*Pteris aquilina* Linn.). Jour. Linn. Soc. Bot. **35**:659–669. 1904.

[6] SEWARD, A. C., Fossil floras of Cape Colony. Ann. S. African Museum **4**: 1–116. *pls. 14. figs. 8.* 1903.

Africa, and South America. The Stormberg beds are considered as of Rhaetic age, and four new species are described. The Uitenhage beds are considered as probably of Wealden age, and the fragmentary remains of nineteen species of plants are enumerated, of which two, a Nilssonia and an Araucarites, are described as new.—EDWARD W. BERRY.

REED[7] has made a cytological study of enzyme-secreting cells in corn and date seedlings. Sections of living tissue were compared with fixed material to avoid error. Torrey's technique[8] is regarded faulty, and no evidence was found to support his observation that solid matter extrudes from the nucleus through interruptions of the nuclear membrane into the cytoplasm. In addition to a careful study of the literature and some valuable data in technique, the observations of special interest are: "(1) In the resting condition the secreting cells of both Zea and Phoenix are crowded with relatively small proteid granules. As secretion begins these granules gradually disappear. In Zea this disappearance coincides closely with consumption of the endosperm; in Phoenix, however, the granules disappear long before the endosperm is dissolved. (2) The chromatin of the nucleus is small in amount at the beginning of secretion and increases as germination progresses. These changes are more noticeable in the case of Zea than in Phoenix."—RAYMOND H. POND.

WIELAND[9] has brought together a large array of facts to support the thesis that polar climate has been the major factor in the evolution of plants and animals. He shows that climatic changes of a character affecting life must in the course of time be at a minimum at the equator and at a maximum at the poles. He also thinks it reasonable that the origin of life itself took place at the north or at both poles; and that the Palaeozoic for various reasons was a period mainly of "generalized origins." From the origin of life down to the Mesozoic the north and south polar areas may have played a well-nigh equal part in creating a certain southward and northward stress; but beginning with the Mesozoic and "extending to the glacial period, overwhelming evidence points to the polar origin and continuous outward dispersion from the north polar area of most of the great plant and vertebrate groups." Among the illustrations of this the author calls attention to "the outward movement especially of conifers and dicotyls from the Arctic area for long periods of time."—J. M. C.

WAGER,[10] in a preliminary paper, has discussed the much debated question of the cell structure of the Cyanophyceae. He concludes that the central body is a nucleus of a "simple or rudimentary type,"although not to be regarded as one of normal type, similar to the nuclei of the higher plants. He enumerates twelve main chemical and morphological characters that belong to the nuclei of higher plants, and claims that at least seven of them belong to the central body of the Cyanophyceae, as follows: (1) presence of a nuclear network, (2) reaction to nuclear stains, (3) behavior toward digestive fluids, (4) presence of phosphorus, (5) presence of masked iron, (6) amitotic division, and (7) presence of chromatin granules on a linin framework. It differs from the nuclei of higher plants in the absence of a true mitosis with spindle fibers, and in the absence of a nuclear membrane and a nucleolus, although in certain conditions both membrane and nucleolus are said to be suggested. The author evidently regards this central body as a developmental stage in the evolution of the nucleus of higher plants.—J. M. C.

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[7] REED, H. S., A study of the enzyme-secreting cells in the seedlings of *Zea Mais* and *Phoenix dactylifera*. Annals of Botany **18**:267. 1904.

[8] TORREY, Cytological changes accompanying the secretion of diastase. Bull. Torr. Bot. Club **29**:421. 1902.

[9] WIELAND, G. R., Polar climate in time the major factor in the evolution of plants and animals. Am. Jour. Sci. IV. **16**:401–430. 1903.

[10] WAGER, HAROLD, The cell structure of the Cyanophyceae. Preliminary paper. Proc. Roy. Soc. **72**:401–408. 1904.

BECAUSE of their perishable nature fungi are rare as fossils, and yet Weiss[11] finds the remains of a parasitic fungus on stigmarian rootlets from the Lower Coal Measures. Magnus has compared this type with the existing Urophlyctis, which it resembles not only in so much of its structure as is discernible, but also in its similar habit of growing on plants which inhabit marshy or at least wet situations. Weiss accords in this identification to the extent of naming the fossil *Urophlyctites Stigmariae.*

The same author[12] notes a mycorhiza from the same geological horizon. Janse is quoted as saying that 69 out of 75 plants in a tropical forest have their roots infested by symbiotic fungi, and while this condition argues considerable specialization on the part of both, the similar conditions that prevailed during the Carboniferous mitigates our surprise at finding symbiosis occurring so far back as this. The roots have not been associated with the plant which bore them; they are possibly lycopodiaceous and are referred to the form-genus Rhizonium of Corda. The hyphae are for the most part intracellular, but in no case is there any sign of injury to the host. The fungus is named *Mycorhizonium,* and is considered as possibly belonging to the Phycomycetes.

ZODDA[13] records the finding of a cone of a species of Pinus still living, in the Lower Pliocene of Sicily.—EDWARD W. BERRY.

A HYBRID between *Drosera rotundifolia* and *D. longifolia* was investigated about a year ago by Rosenberg.[14] He found that *D. rotundifolia* has ten chromosomes in the pollen mother-cells, while *D. longifolia* has twenty; further, that in the hybrid there are found pollen mother-cells with ten, twenty, and fifteen chromosomes, the ten and twenty being the number characteristic of pure pollen mother-cells of the two parents, while the number fifteen is just what one would expect in the pollen mother-cells of a genuine hybrid. A recent paper[15] records the results of investigations upon the embryo sac mother-cells of the parent and the hybrid. The sporophytic cells of the hybrid always show thirty chromosomes. In the pollen mother-cells and embryo sac mother-cells, the number of chromosomes is twenty, a very surprising number. These twenty chromosomes are not alike, but of two sizes, ten being large and ten small. The large chromosomes are evidently double and the small ones single. *D. rotundifolia* is represented in the hybrid by ten chromosomes and *D. longifolia* by twenty. In the mother-cell the ten chromosomes of *D. rotundifolia* fuse with ten of *D. longifolia*, thus leaving the other ten chromosomes of *D. longifolia* single. These are the numbers as seen during the metaphase. The daughter nuclei of the tetrads contain quite regularly ten chromosomes, presumably five being single and five double. It is evident that these observations have an important bearing upon the problem of the reduction of chromosomes, and it is to be hoped that the full account of the investigations will not be long delayed.—C. J. CHAMBERLAIN.

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[11] WEISS, F. E., A probable parasite of stigmarian rootlets, New Phyt. **3**:63–68. 1904.

[12] WEISS, F. E., A mycorhiza from the Lower Coal Measures. Annals of Botany **18**:255–265. *pls. 18, 19.* 1904.

[13] ZODDA, G., *Pinus Pinea* L. fossile nel Pontico di Messina. Malpighia **17**: 488–492. 1903.

[14] Review in BOT. GAZ. **36**:152. 1903.

WITH THE rediscovery of Mendel's laws by Correns, Tschermak, and De Vries, there has been a revival of interest in the fundamental problems of heredity and hybridization, and many works of both experimental and speculative character have appeared. One of the most active workers in this field is Correns. In several recent papers he has presented an account of some of his hybridizing experiments and has discussed questions of dominance.

A very striking result of experiments with Mirabilis hybrids[16] was the production of characters in the offspring, which were found in neither parent. Thus the offspring of dark yellow or pale yellow *Mirabilis Jalapa* crossed with the pure white form, never showed either yellow or white, but all were red or rose-colored. In the second generation these red-flowered hybrids gave rise to a whole series of forms, red-striped, white, pale yellow, rose, and red. Similarly *M. Jalapa* of whatever color crossed with *M. longiflora* (white with a red-violet throat), resulted in offspring having violet corollas, differing in the different cases only in the intensity of the color.

In discussing dominance[17] he points out that there may be every degree of dominance and suggests that a character be considered dominant if it occur in 75 to 100 per cent. of the offspring, and recessive if it occur in 0 to 25 per cent. of the offspring. Characters transmitted to 25 to 75 per cent. are intermediate;

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[15] ROSENBERG, O., Ueber die Tetradenteilung eines Drosera-Bastardes. Ber. Deutsch. Bot. Gesells. **22**:47–53. *pl. 4.* 1904.

[16] CORRENS, C., Ueber Bastardirungsversuche mit Mirabilis-Sippen. Ber. Deutsch. Bot. Gesells. **20**:594–608. 1902.

[17] CORRENS, C., Ueber die dominierenden Merkmale der Bastarde. Ber. Deutsch. Bot. Gesells. **21**:133–147. 1903.

there is no dominance. Careful determinations of the intensity of color in parents and offspring showed that many errors have been made regarding dominance, through the neglect of Weber's law. The intensity of the color does not measure the amount of pigmentation. He concludes that complete dominance is much less common than has been supposed. In a second paper on dominance[18] he presents a number of cases which do show complete dominance; *e. g.*, *Hyoscyamus annuus*×*niger* shows absolute dominance of the biennal habit. Rimpau found, on the other hand, that the annual habit is completely dominant in *Beta patula* × *vulgaris;* dioecism dominates monoecism in *Bryonia alba*×*dioica*. Correns opposes the statement by De Vries that dominance is characteristic of hybrids between races and that hybrids between species are intermediate. He shows that in form and color of root the hybrids between turnip races are intermediate, and he also gives examples of dominance in hybrids between distinct species. He discusses[19] the unique suggestion of De Vries that hybrids which fail to "split" in the second generation have *Anlagen* in one parent unmatched by corresponding *Anlagen* in the other, and concludes that no such condition exists, and that if no splitting occurs it is due to some other cause than that there is nothing to split.

Correns has recently reviewed[20] the present state of our knowledge of the origin of species. He presents the experimental work which has been done, laying most stress on the work of De Vries and Johannsen. The presentation is fair in the main, but one cannot avoid feeling that he begs the question as to the significance of individual variations for evolution, when he distinguishes mutations as *inheritable* variations, however slight.—G. H. SHULL.

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[18] CORRENS, C. Weitere Beiträge zur Kenntnis der dominierenden Merkmale und der Mosaikbildung der Bastarde. Ber. Deutsch. Bot. Gesells. **21**:95–201. 1903.

[19] CORRENS, C., Die Merkmalspaare beim Studium der Bastarde. Ber. Deutsch. Bot. Gesells. **21**:202–210. 1903.

[20] CORRENS, C., Experimentelle Untersuchungen über die Entstehung der Arten auf botanischen Gebiet. Arch. f. Rassen- und Gesellschafts-Biologie **1**:27–52. 1904.